

THE RELATIONSHIP OF ENVIRONMENTAL EXPOSURE TO POLYCHLORINATED BIPHENYLS AND P,P'-DDE WITH HUMAN SPERM SEX-CHROMOSOME DISOMY

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Background and Aims: Chromosomal abnormalities contribute substantially to reproductive problems, yet environmental risk factors have not been well investigated. We evaluated associations between PCBs and p,p'-DDE exposure with sperm sex-chromosome disomy.

Methods: We conducted a cross-sectional study of 192 men from subfertile couples. Multiprobe fluorescence in situ hybridization (FISH) for chromosomes X, Y, and 18 was used to determine XX, YY, XY, and total sex chromosome disomy in sperm, using a semi-automated scoring method. Serum was analyzed for concentrations of 57 PCB congeners and p,p'-DDE. Poisson regression models were used to calculate incidence rate ratios (IRRs) for disomy by exposure quartiles controlling for potential confounders and semen parameters.

Results: The median percent disomy was 0.3 for XX and YY, 0.9 for XY, and 1.6 for total sex chromosome disomy. After adjustment, total sex chromosome disomy IRR for the highest vs. lowest quartile of serum DDE exposure was 1.27 (95% CI: 1.22-1.33). IRRs showed significantly increasing trends for increasing quartiles of p,p'-DDE in XX, XY, and total sex chromosome disomy. There was a significant increase in IRRs of YY, XY, and total sex chromosome disomy for increasing quartiles of the Σ 4prevalent PCBs (118, 138, 156, and 180) and Σ estrogenic PCBs (44, 49, 52, 101, 187, 174, 177, 157/201). There was also an increase in XY and total sex chromosome disomy for increasing quartiles of Σ dioxin-like PCBs (95/66, 74, 77/110, 105/141, 118, 156, 167, 128, 138, 170). For XX disomy, however, IRRs decreased significantly with increasing quartiles for all PCB summary measures examined (Σ 4prevalent, Σ estrogenic, and Σ dioxin-like).

Conclusions: Our findings suggest DDE may be associated with increased XX, XY and total sex chromosome disomy, while PCB exposures may be associated with increased YY, XY and total sex chromosome disomy, but decreased XX disomy. These findings require confirmation in further studies.